

Claims

- 5 1. An apparatus for tempering a bent glass sheet, comprising a means of conveying the sheet along a predetermined path through the apparatus, and a pair of blastheads for quenching the sheet with jets of quench gas, the blastheads comprising upper and lower blastheads arranged in opposed relationship above and below the predetermined path, each blasthead comprising a plurality of spaced elongate plenums for supplying quench gas to an array of  
10 quench nozzles from which the jets of quench gas issue, the length of the quench nozzles exceeding their diameter, and the quench nozzles of each plenum being mutually inclined to provide diverging jets of quench gas, characterised in that the plenums extend transversely to the direction of conveyance of the bent glass sheet and the array of quench nozzles is curved in at least one direction.
- 15 2. An apparatus as claimed in claim 1, wherein the array of quench nozzles comprises rows of quench nozzles extending along lines which are curved in the direction of elongation of the plenums.
- 20 3. An apparatus as claimed in claim 2, wherein the rows of quench nozzles extend along lines which are curved to match the average local curvature of the bent glass sheet in the corresponding direction.
- 25 4. An apparatus as claimed in any preceding claim, wherein successive plenums in the direction of conveyance are arranged so that their profile at the level of the nozzles is curved in the direction of conveyance.
- 30 5. An apparatus as claimed in claim 4, wherein the profile of the plenums is curved to match the average local curvature of the bent glass sheet in the direction of conveyance.
6. An apparatus as claimed in claim 4 or claim 5, wherein the blastheads are arranged to be movable towards and away from each other.

7. An apparatus as claimed in any preceding claim, wherein the apparatus has a centreline parallel to the direction of conveyance, and successive plenums of the lower blasthead are connected to each other by connecting surfaces which are inclined downwards away from the centreline.

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8. An apparatus as claimed in claim 7, wherein successive plenums of the upper blasthead are connected to each other by connecting surfaces which are inclined downwards towards the centreline, so that the connecting surfaces of the upper and lower blastheads diverge away from the centreline.

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9. An apparatus as claimed in any preceding claim, wherein the quench nozzles are formed as bores in a nozzle bar, the outlets of the nozzles being level with a surface of the bar, at least one such bar being incorporated into each plenum at its end nearest to the path of conveyance of the bent glass sheet.

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10. An apparatus as claimed in claim 9, wherein the bores are part cylindrical and part conical, the conical part being at the inlet end.

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11. An apparatus as claimed in claim 10, wherein the length of the cylindrical part of the bore is equal to or greater than the length of the conical part.

12. An apparatus as claimed in any one of claims 9 to claim 11, wherein the bar is non-metallic, e.g. it is composed of polytetrafluoroethene.

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13. A method of tempering a bent glass sheet, comprising conveying the sheet along a predetermined path through an apparatus according to claim 1, and quenching the sheet with diverging jets of quench gas, characterised by conveying the bent glass sheet transversely to the direction of elongation of the plenums, the diverging jets of quench gas issuing from an array of quench nozzles which is curved in at least one direction.

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14. A method of tempering a bent glass sheet as claimed in claim 13, comprising moving the blastheads apart to allow the sheet to enter between them, moving the blastheads towards each other for the quenching operation, and moving them apart again to allow the sheet to

exit from between the blastheads.

15. A method as claimed in claim 13 or 14, wherein the bent glass sheet is elongate in one direction, comprising conveying the sheet with its direction of elongation perpendicular to the direction of conveyance and parallel to the direction of elongation of the plenums.
16. A method as claimed in any one of claims 13 to 15, wherein the jets of quench gas are arranged to impinge on the glass sheet in a “domino 5” pattern.
17. A method as claimed in any one of claims 13 to 16, wherein the toughening stresses generated in the bent and tempered glass sheet are non-uniform.
18. A production line for producing bent and tempered glass sheets, comprising a furnace for heating the glass sheets, a bending station, an apparatus according to any one of claims 1 to 12, an unloading station and a means of advancing the sheets along a predetermined path along the line.